Alg. 2 Warm Up #11-1

1.

$$\frac{2x + 15}{x^2 + x - 12} - \frac{3x - 6}{x^2 - 5x + 6}$$

2.

$$\frac{\dfrac{2x^2 + 6x}{x^2 - x - 20}}{\dfrac{x^3 + 5x^2 + 6x}{x^2 - 3x - 10}}$$

$$\frac{\dfrac{2x^2 + 6x}{x^2 - x - 20}}{\dfrac{x^3 + 5x^2 + 6x}{x^2 - 3x - 10}}$$

HW Questions:

CL 3-127. Solve the following systems algebraically. What does each solution reveal about the graph of the equations in the system?

a. $x+2y=17$
$x-y=2$

b. $4x+5y=11$
$2x+6y=16$

c. $4x-3y=-10$
$x=\frac{1}{4}y-1$

d. $2x+y=-2x+5$
$3x+2y=2x+3y$

$$4x+y=5$$
$$x-y=0$$
$$5x=5$$
$$x=1$$

$$1-y=0$$
$$y=1$$

$$\boxed{(1,1)}$$

CL 3-128. Solve each equation after first rewriting it in a simpler equivalent form.

a. $3(2x-1)+12=4x-3$

b. $\frac{3x}{7}+\frac{2}{7}=2$

c. $4\cdot\frac{3}{4}x^2=\left(\frac{5}{4}x+\frac{1}{2}\right)4$

d. $4x(x-2)=(2x+1)(2x-3)$

$$3x^2=5x+2$$

$$3x^2-5x-2=0$$

$$(3x\quad 1)(x\quad 2)=0$$

CL 3-129. Which of the following pairs of equations or expressions are equivalent? Justify your reasoning either by using algebra to transform the first equation or expression into the second or by demonstrating with a counterexample.

a. $n(2n+1)(2n-1)$; $4n^2-n$

b. $(2x-1)^2$; $4x^2-1$

c. $10x^2-55x-105$; $5(2x+3)(x-7)$

d. $\left(\frac{4x^{12}}{-2x^8}\right)^3$; $-8x^{12}$

e. $2x-3y=6$; $y=\frac{2}{3}x+6$

f. $\sqrt{108}$; $6\sqrt{3}$

$5(2x^2-14x+3x-21)$

$5(2x^2-11x-21)$

$10x^2-55x-105$

CL 3-130. Perform the indicated operation on each of the following rational expressions. Be sure to state any values of the excluded variable and that your final answer is simplified. If a graphing tool is available, check the graph of the original problem to see if it coincides with the graph of your answer.

a. $\frac{x^2-x-6}{x^2-9} \cdot \frac{x^2+5x+6}{x^2+4x+4}$

b. $\dfrac{\frac{x^2-1}{x}}{\frac{x^2-2x+1}{2x^2+x}}$

$\frac{x^2-1}{x} \cdot \frac{2x^2+x}{x^2-2x+1}$

$\frac{(x+1)\cancel{(x-1)}}{\cancel{x}} \cdot \frac{\cancel{x}(2x+1)}{\cancel{(x-1)}(x-1)}$

$\frac{(x+1)(2x+1)}{(x-1)}$

CL 3-130. Perform the indicated operation on each of the following rational expressions. Be sure to state any values of the excluded variable and that your final answer is simplified. If a graphing tool is available, check the graph of the original problem to see if it coincides with the graph of your answer.

a. $\frac{x^2-x-6}{x^2-9}\cdot\frac{x^2+5x+6}{x^2+4x+4}$

b. $\frac{\frac{x^2-1}{x}}{\frac{x^2-2x+1}{2x^2+x}}$

CL 3-131. Evan spent the summer earning money so he could buy the classic car of his dreams. He purchased the car for \$2295 from Fast Deal Freddie, the local used car salesman. Freddie told Evan that the car would increase by half its value after five years. Evan knows that this model appreciates 8% annually. Did Freddie try to trick Evan, or was his claim accurate?

100% + 8%

108%

Multiplier = 1.08

$y = 2295(1.08)^t$

$y = 2295(1.08)^5$

$y \approx \$3,372.11$

$$\begin{array}{r} 2295.00 \\ +\ 1147.50 \\ \hline \$3,442.50 \end{array}$$

CL 3-132. Decide whether each function below is even, odd or neither, and explain your reasoning.

a. $y = x^3 + x$ b. $y = x^2 + x$ c. $y = x^4 + x^2$

CL 3-133. First, identify the parent graphs of the following equations. Then, describe how their graphs would be transformed from the parent graphs.

a. $y = 0.25(x-8)^3 + 2$

b. $(x+3)^2 + y^2 = 25$

c. $y = |x-5| + 3$

parent: $y = |x|$

odd
graph: has 180° rotational sym.. about the origin
algebra: $f(-x) = -f(x)$

even
graph: y-axis sym.
algebra: $f(-x) = f(x)$

CL 3-134. Last year, Jennifer paid the following for her electricity based on the number of kWh (kilowatt-hours) that she used each month.

kWh used	0 – 20,000	20,000 +
Cost per kWh (cents)	9.1225	6.5714

Rate
slope

a. Make a graph of Jennifer's electrical rates.

b. Describe the domain of each of the pieces of this function. Then write an equation for each part of the domain.

c. This year the electrical company has said it is going to raise its rates by 3%. Describe how this will transform the graph and then write new equations for each part of the domain.

$y = 9.1225x$ $0 \le x \le 20{,}000$

$y = 6.5714x$ $x > 20{,}000$

CL 3-135. Describe the domain and range of each function or sequence below.

a. The function $f(x) = (x-2)^2$.

b. The sequence $t(n) = 3n - 5$.

d: n = positive integers

r ⇒ $y = -2, 1, \ldots$

or $y = 3n - 5$

CL 3-136. Find the x- and y-intercepts of $y = x^2 - 3x - 3$.

$0 = x^2 - 3x - 3$

$3 = x^2 - 3x + \frac{9}{4}$

$+\frac{9}{4}$

$\pm\sqrt{\frac{21}{4}} = \sqrt{\left(x - \frac{3}{2}\right)^2}$

$\pm\frac{\sqrt{21}}{2} = x - \frac{3}{2}$

$x = \frac{3}{2} \pm \frac{\sqrt{21}}{2}$

$\left(\frac{3}{2} + \frac{\sqrt{21}}{2}, 0\right)$ $\left(\frac{3+\sqrt{21}}{2}, 0\right)$

$\left(\frac{3}{2} - \frac{\sqrt{21}}{2}, 0\right)$

CP's: 4- # 1---> 3 (own paper)

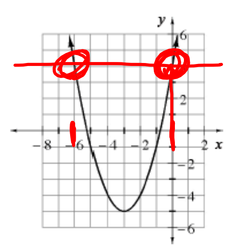
4.1.1 How can I solve?

p. 169

Strategies for Solving Equations

Today you will have the opportunity to solve challenging equations. As you work with your team, the goal of this section is for you to apply your strategies for solving equations to other types of equations. You will be challenged to use multiple approaches and to write clear explanations to show your understanding.

4-1. SOLVING GRAPHICALLY



One of the big questions of Chapter 2 was how to the find special points of a function. For example, you now have the skills to look at an equation of a parabola written in graphing form and name its vertex quickly. But what about the locations of other points on the parabola? Consider the graph of $y = (x+3)^2 - 5$ at right.

a. How many solutions does the equation $y = (x+3)^2 - 5$ have? ∞
How is this shown on the graph? All points on the parabola

b. Use the graph to solve the equation $(x+3)^2 - 5 = 4$.
How did the graph help you solve the equation? $x = -6, 0$

Look where the parabola intersects with $y = 4$

4-2. ALGEBRAIC STRATEGIES

The graph in problem 4-1 was useful to solve an equation like $(x+3)^2 - 5 = 4$. But what if you do not have an accurate graph? And what can you do when the solution is not on a grid point or is off your graph?

Your Task: Solve the equation below algebraically (that is, using the equation only and without a graph) in at least three different ways. The "Discussion Points" below are provided to help you get started. Be ready to share your strategies with the class.

$$(x+3)^2 - 5 = 4$$

Discussion Points

What algebraic strategies might be useful?

What makes this equation look challenging? How can we make the equation simpler?

How can we be sure that our strategy helps us find *all* possible solutions?

Strategies from Algebra 1:

* Undo * Rewrite * Look Inside

* Undo

Reversing or doing the opposite of an operation.

$$(x+3)^2 - 5 = 4$$
$$+5 \quad +5$$
$$\sqrt{(x+3)^2} = \sqrt{9}$$
$$x+3 = \pm 3$$
$$-3 \quad -3$$
$$x = 0, -6$$

* Rewrite

Using algebra to rewrite an equivalent equation that is easier to solve.

$$(x+3)^2 - 5 = 4$$
$$x^2 + 6x + 9 - 5 = 4$$
$$x^2 + 6x + 4 = 4$$
$$x^2 + 6x = 0$$
$$x(x+6) = 0$$

* Look Inside

Use reasoning about the value of the expression inside the function or ( )'s.

$$(x+3)^2 - 5 = 4$$

What minus 5 = 4? 9

What squared = 9? ±3

So: $x+3 = -3$ or $x+3 = 3$

$-3 \quad -3 \qquad -3 \quad -3$

$$\boxed{x = 0, -6}$$

4-3. Three strategies your class or team may have used in problem 4-2 are **Rewriting** (using algebra to write a new equivalent equation that is easier to solve), **Looking Inside** (reasoning about the value of the expression inside the function or parentheses), and **Undoing** (reversing or doing the opposite of an operation; for example, taking the square root to eliminate squaring). These strategies and others will be useful throughout the rest of this course. Examine how each of these strategies can be used to solve the equation below by completing parts (a) through (f).

$$\frac{x-5}{4}+\frac{2}{5}=\frac{9}{10}$$

a. Ernie decided to multiply both sides of the equation by 20 so that his equation becomes $5(x-5)+8=18$. Which strategy did Ernie use? How can you tell?

b. Elle took Ernie's equation and decided to subtract 8 from both sides to get $5(x-5)=10$. Which strategy did Elle use?

c. Eric looked at Elle's equation and said, "*I can tell that (x – 5) must equal 2 because 5 • 2 = 10. Therefore, if x – 5 = 2, then x must be 7.*" What strategy did Eric use?

d. How many solutions does the function $y=\frac{x-5}{4}+\frac{2}{5}$ have? How can you use the graph of $y=\frac{x-5}{4}+\frac{2}{5}$ on your graphing calculator to check your solution to $\frac{x-5}{4}+\frac{2}{5}=\frac{9}{10}$? Where did you look on the graph?

e. How can you use the table for $y=\frac{x-5}{4}+\frac{2}{5}$ on your graphing calculator to check your answer? Where did you look on the table?

f. Use the strategies from parts (a) through (c) in a different way to solve $\frac{x-5}{4}+\frac{2}{5}=\frac{9}{10}$. Did you get the same result?

HW: 4- #4, 10, 13
and Pink Review worksheet.

Chapter 3 Test is tomorrow.

Redo today's warm up for practice.
Revisit homework problems.
Look over your notes.